

# **ADC-DSP platform is applicable in fiber optic telecommunications**

Semtech Corp. today announced it is working with IBM Corp. and its innovative 3D through-silicon via (TSV) technology to develop a high-performance ADC/DSP platform that has applications in fiber optic telecommunications, high performance RF sampling and filtering, test equipment and instrumentation, and sub-array processing for phased array radar systems.

Integration of high-performance data converters with advanced digital signal processing has traditionally been a difficult problem due to mixed IC technology requirements, management of chip-to-chip interconnect with high density, high power and high bandwidth and limited options for high-reliability multi-chip packaging with excellent thermal management. Numerous emerging applications may be significantly cost-reduced, and other new applications enabled, if ultra high performance data converters and/or RF transceivers constructed in the most advanced RF-optimized technologies can be efficiently married into a single package, along with highly-integrated application-specific digital processing constructed in the latest ultra-fine geometry CMOS technologies.

“Our strategic partnership with IBM is enabling Semtech and our leading-edge customers to define and develop a unique and versatile integrated ADC/DSP platform, applicable to multiple highly demanding system applications,” said David Clark, Vice President of Microwave & Millimeter-wave Products at Semtech Corporation. “Further, this first-generation 3D multi-chip module will validate key building blocks that will enable the accelerated time-to-market of future products with unique DSP content for specialized applications.

Semtech is partnering with IBM to develop the end-to-end module solution utilizing IBM’s 3D interposer technology to interconnect ADC functions in IBM custom logic SOI-based Cu-45HP technology with interleaver ICs in IBM’s 8HP BiCMOS SiGe technology. These two different technologies are connected through a single wiring layer on an interposer, which supports a bandwidth of greater than 1.3 Tbps in this design.

IBM’s 3D technology combines cost effective 90nm BEOL wiring levels for high speed signaling between die as well as providing ultra high capacitance density by integrating deep-trench (DT) capacitors at the top surface of the interposer. As frequency increases, the use of integrated decoupling capacitors is more attractive to counteract power supply noise effects that typically may be second order issues for slower applications. The interposer also connects to a package using copper TSV technology. Figure 1 shows a cross section of the 3D chip with actual SEM cross sections of the interposer chip and DT capacitors.

“We are delighted to be working with Semtech to utilize IBM’s 300mm 3D

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technology for its advanced product applications,” said Dan Berger, IBM Manager of 3D Technology Development at its Semiconductor Research and Development Center (SRDC). “3D technology provides a path to integrate CMOS and SiGe technology at very high bandwidth and with low power to provide a seamless high-performance module solution. IBM’s semiconductor, wafer finishing and assembly facilities offer a one-stop module solution for Semtech and its product partners. We also see significant benefits using 3D technology for other applications to address issues such as I/O power, power supply, interconnection bandwidth between components, modularity for re-use of IP or mixing technology nodes effectively, and form factor improvements that can be obtained by integrating components together in a smart cost effective manner.”

Clark added: “Once developed, the 3D TSV packaging platform can easily support future product upgrades by replacing any of the utilized IC technologies, either individually or in combination, to enhance the product performance as the next generation base technologies come on-line. For instance, future product versions could upgrade the 8HP ICs to 9HP, the custom logic Cu-45HP to 32-SOI, active circuitry could be incorporated into the interposer, etc. The modularity of the 3D TSV platform provides the utmost flexibility for product roadmap longevity.”

### **Availability**

Semtech will have first ADC/DSP prototype modules available in 2011 and are working with partners to extend these product offerings utilizing these technology elements. Near-term applications include 100Gbps coherent receiver for fiber optic telecommunications, high performance RF sampling and filtering, test equipment and instrumentation, and sub-array processing for phased array radar systems. Semtech offers comprehensive design assistance, including field- and factory-based support. Data sheets, volume pricing, and delivery quotes, as well as evaluation kits and samples, are available at [www.semtech.com/info](http://www.semtech.com/info) [1].

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[1] <http://www.semtech.com/info>